Assimilation of ozone profiles from the Improved Limb Atmospheric Spectrometer-II: study of Antarctic ozone

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Abstract

Ozone data from the Improved Limb Atmospheric Spectrometer-II (ILAS-II) were included in addition to other satellite observations in the ozone assimilation system at the Global Modeling and Assimilation Office (GMAO) of NASA/Goddard. The control run assimilated data from NOAA 16 Solar Backscatter Ultraviolet/2 (SBUV/2) and Polar Ozone and Aerosol Measurement III (POAM III) instruments. Persistent impacts over Antarctica and transient impacts over northern middle and high latitudes are seen from April to October 2003, when ILAS-II provided good coverage. The largest improvements with respect to independent ozone sonde data are seen over the South Pole station. Ozone analyses and forecasts from the assimilation of SBUV/2, POAM III and ILAS-II data are used to investigate the transport of ozone to southern middle latitudes following the breakup of the Antarctic vortex. The quality of analyses and forecasts is evaluated by comparison with independent Stratospheric Aerosol and Gas Experiment III (SAGE III) ozone data near 46ºS. Anomaly correlations between SAGE III data and forecasts exceed 0.6 for up to five to seven days at 30, 50, and 70 hPa. The loss of skill with advancing forecast length is related to dynamical errors due to an excessively persistent vortex in longer forecasts, which hampers the transport of low ozone air into middle latitudes.